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# Engaging qualities: factors affecting learner attention in online design studios

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This study looks at the qualities of learner-generated online content, as rated by experts, and how these relate to learners' engagement through comments and conversations around this content. The work uploaded to an Online Design Studio by students across a Design and Innovation Qualification was rated and analysed quantitatively using the Consensual Assessment Technique (CAT). Correlations of qualities to comments made on this content were considered and a qualitative analysis of the comments was carried out. It was observed that design students do not necessarily pay attention to the same qualities in learner-generated content that experts rate highly, except for a particular quality at the first level of study. The content that students do engage with also changes with increasing levels of study. These findings have implications for the learning design of online design courses and qualifications as well as for design institutions seeking to supplement proximate design studios with Online Social Network Services.

*Online Design Studio; Online Social Network; Learner-generated Content; Consensual Assessment Technique*

## Introduction

Interactions in online or virtual design studios have been of wide scholarly interest for nearly two decades now (Arvola & Artman, 2008; Broadfoot, Bennett, & Bennett, 2003; Hart, Zamenopoulos, & Garner, 2011; Kvan, 2001; Maher, M. L., & Simoff, 1999; Robbie, D., & Zeeng, 2012).

The studio is a space for purposeful as well as serendipitous interactions (Ashton & Durling, 2000; Joel, 2007). Discussions usually emerge around the artefacts design students create and share, either by placing them around their desk or in a shared area. The virtual studio discussed here is not unlike this: students upload their designs to present and discuss them. Similarly, social media services like Ning, Flickr Instagram or Facebook can also facilitate design students' interaction around the artefacts that they have created (Fleischmann, 2014; McCarthy, 2013; Robbie, D., & Zeeng, 2012;



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Schadewitz & Zamenopoulos, 2009; Sharples et al., 2013). These social media and Web 2.0 applications have been used more to augment than replace traditional design studios and often to facilitate collaboration of students across a distance (Fleischmann, 2014; Ham & Schnabel, 2011). However, an additional outcome of this approach is a significant increase in the volume of material shared and available.

This increase in volume applies in an educational context too and has both positive and negative effect. Weller, coining the term 'Pedagogy of Abundance', outlines some significant potential benefits (Weller, 2011), whilst Donelan, Kear and Ramage (2010) note that an overload of information, or 'information chaos', can have a negative effect on students in an online distance learning environment. In online design studios, the positive effect of abundance helping learners to build awareness of the multiplicity of creative approaches and solutions in the creative industries was observed (Lotz, Jones, & Holden, 2015). To navigate the landscape of user-generated creative content, but avoid information overload, learners in creative industries need to acquire strategies to identify quality content with which they may then interact (McCloughlin & Lee, 2007).

In the discussion of previous findings on social engagement in Online Design Studios (Lotz, Jones, & Holden, 2015; Jones, Lotz & Holden, 2017) we hypothesised that high quality uploads stood out from others because of the strength of image or an unusual, attention grabbing, approach to the task, which might lead to interaction with the contents. It was proposed that exploring the link between the quality of user-generated online content and the engagement with those contents in an online design studio is worthy of systematic investigation. Quality in this sense was assumed to be what we, as design educators and experts, considered to be of quality in a design sense. What we discovered was that students might not see it this way.

## Background

### *Online design studios*

The 'studio' has been identified as a signature design pedagogy (Crowther, 2013) and although the elements that constitute it are not defined precisely, they generally include the following principles:

- **Apprenticeship** – learning takes place with expert 'support'
- **Simulation** – a learning experience that is close to actual practice but performed in a safe space
- **Problem-based** – learning is constructivist and process as well as discourse oriented
- **Flexible** – adaptive spaces and infrastructure to allow for serendipity
- **Generative** – a credible, realisable designed visual/tactile output is produced
- **Semi-public** – it is performed, critiqued and judged amongst peers
- **Social** – social and peer support enables the building of a community
- **Transformative** – learning is changing a person

Several scholars have attempted to carry aspects of this signature pedagogy into the online world (Arvola & Artman, 2008; Shao, Daley, Vaughan, & Lin, 2009), initially addressing aspects of technical feasibility (Maher, M. L., & Simoff, 1999; Kvan, 2001), making way for experimentations in distributed global collaboration (Bohemia, Harman, & Lauche, 2009), 3-d immersive worlds (Grove, P. W. & Steventon Dr., 2008), and portfolio and personal learning spaces (Pontydysgu, 2007). In addition to developing bespoke virtual design studio spaces, many contemporary online design studios blend commercial communication, image sharing and social network services as required by the design learning context and brief (Robbie, D., & Zeeng, 2012; McCarthy, 2013; Fleischmann, 2014). As the knowledge of the scope of online design studios evolves, researchers have become more interested in the social mechanisms by which online studios support learning (Sidawi, 2012),

an area in which design scholars can learn from studies about the interactions with Online Social Networks (OSN).

### ***User-generated online content***

User-generated or user-created content became a defining term for many Web 2.0 sites and services. Content for sites like Wikipedia or Flickr is generated by users to be published or distributed on these sites, often through linking, reusing of existing content or the creation of entirely novel content. Researchers strongly agree that user-generated online content varies in quality (Agichtein, Castillo, Donato, Gionis, & Mishne, 2008; Chai, Potdar, & Dillon, 2009). Not all content receives the same amount of user attention. In the context of OSN, it was hypothesised that when there is a large selection of content, users of online media only pay attention to high quality content (Wang, Ye, & Huberman, 2012). But what constitutes high quality content? In a recent study on Facebook user behaviour evolution (Paul, Puscher, & Strufe, 2015), high quality content was defined as original user-generated content in contrast to commenting or distributing other contents. From a literature review of quality assessment of online contents in different social network sites, Chai et al (2009) proposed a framework for the assessment of the quality of social media content that encompasses several dimensions. They identified that User Feedback was the most-frequently used measure to assess quality of online content. Currently, there is no single, agreed definition or assessment of what constitutes high quality content in social media beyond such simple measures.

In the education context, learner-generated content was proposed to enhance student engagement and student success, this is content that is dynamically generated in the learning process (McCloughlin & Lee, 2007). As with user-generated content, the quality of learner-generated content is also of concern. Pérez-Mateo, Maina, Romero, and Guitert (2011) propose defining quality of learner-generated content in terms of the actual content, i.e. its creativity, the format of the content, i.e. its representation, and the process of the content-interaction, i.e. commenting. This twofold content/process definition of quality has been the focus of more recent research as well as improving learner-generated content quality through guided feedback or peer-to-peer feedback (for example Murray, McGill, Thompson, and Toohey (2017)). Clearly, a complete definition of quality of user or learner-generated content is still missing, but this work attempts to take into account both the independently expert-rated quality of content as well as the learner comments on the qualities of work uploaded to an online design studio.

It is of great interest to researchers to better understand which user-generated content attracts students' engagement and why. Increased engagement with content drives not only sales or brand loyalty in commercial social networks, but it also improves retention and success in learning contexts (Hamid, Waycott, Kurnia, & Chang, 2015). The motivation for this paper is to better understand the relationship between engagement and the quality of student generated content.

### ***Conversations around user-generated online content***

In tandem with the learner-creation of content, a key principle of interaction and learning in the online design studio is artefact-centred conversation (Ferguson & Shum, 2012). In the proximate design studio, discussions around visual or tactile artefacts help design students to reflect on the creations, iterate and improve on those and learn in the process (Schön, 1987). In most cases though, research has looked at formal 'crits' and student-teacher conversations, rather than peer-to-peer conversations around artefacts (Gray, 2013).

Comparing students' interactions and success in a proximate design studio with an OSN design studio in an experimental setting, Güler (2015) found that students perceived the OSN to be a more participatory and active communication environment, they also perceived peer critiques and viewing the progress of other students' work to be more valuable compared to a proximate design studio. Clearly, informal communication and social engagement in the online design studio is of great value to design students and this value is a significant driver of student engagement.

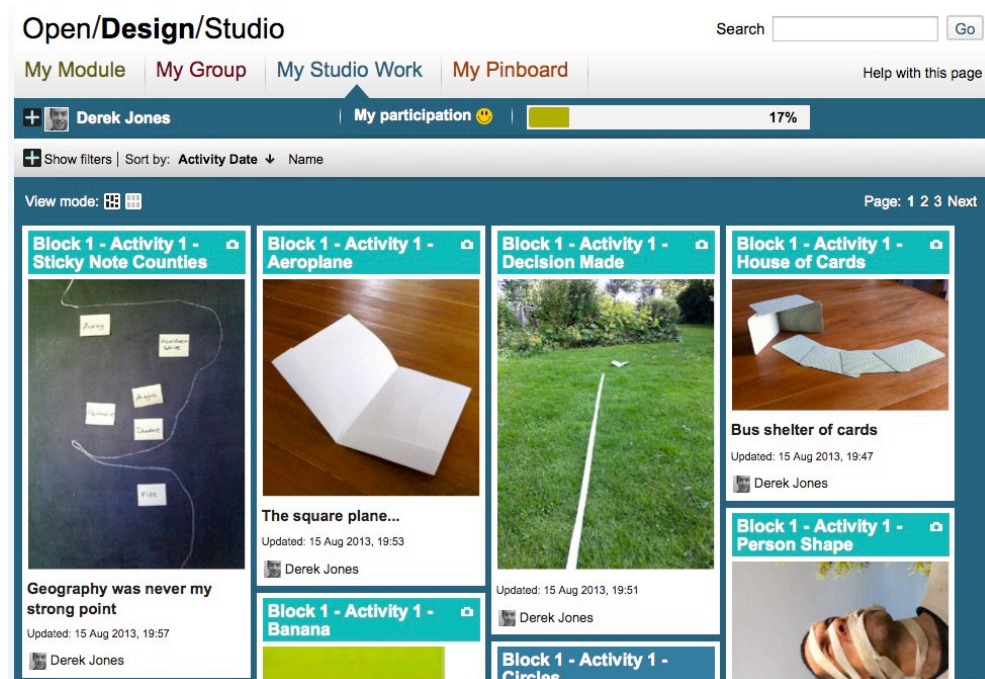
But we still know very little about how the content itself influences the learners' interaction with the content. This paper seeks to enhance our understanding and asks: "How does the quality of learner-generated online content relate to learners' engagement through comments and conversations around this content?"

## Methodology

### *Setting: Open Design Studio*

The study utilised data collected from learner-engagement with a bespoke Virtual Design Studio used in a Design and Innovation Degree at a large distance education institution in the UK.

The Design and Innovation Degree has three main design modules, one at each level of study. All of these core modules utilise the OpenDesignStudio (ODS), which is an online portfolio and communication space that allows students to post, view and discuss artefacts which they create and find. Digital artefacts can be uploaded to predetermined 'slots' (Figure 1) corresponding to activities in the teaching materials, or to the pinboard where the student is free to post whatever they wish. All posts are viewable to the student cohort by default, though privacy can be set by students. The affordances of ODS enable a range of peer-learning opportunities. The tool is simple enough to use so that no significant time is needed for familiarisation.



*Figure 1 Main interface of OpenDesignStudio online virtual studio tool, showing predetermined upload 'slots'.*

Figure 2 shows how students comment on individual posts, primarily through text, like forum replies though audio commenting is also possible. Students can also engage in quick interaction by using simple Favourite, Smile and Inspire buttons that avoid placing any barriers in the way of student communication and interaction.



### *Consensual Assessment of quality of work posted to ODS*

The Consensual Assessment Technique – CAT (Amabile, 1982) was chosen to collect quantitative data on the consensual assessment of the quality of students' work uploaded to ODS. CAT has been validated as a reliable technique to assess creativity. This technique has previously been employed to rate creativity of work in art, or literature, but to a lesser extent in design (K. K. Jeffries, 2012). Assessors, who are experienced in the domain studied, independently rate a piece of work on its creativity and several other dimensions. The judges rate the work relative to their own implicit standards of creativity without using a predetermined or pre-selected definition of creativity. Interrater agreement is calculated to check the validity of the rating, which is usually high. The mean of all raters' scores is taken as the consensual score for the qualities assessed, e.g. creativity or originality.

The source of initial samples was a group of students who had completed all modules and for whom a full dataset of work in ODS was available, a total of 37 students. These students were all contacted and asked to take part in an interview as part of the wider project. From this, 9 students accepted, and became the overall sample for choosing material for the CAT process. CAT requires the researcher to make several choices about the rating procedure. Within this sample, the aim was to select one ODS upload from one design activity per level of study for each student. However, not every student had uploaded work for every activity set out in the module affecting the final choice of material. In addition, some material was also rejected for rating because it was not in a format that would allow a rating in some criteria (for example, a text document was judged to be unlikely to be assessed equitably against a visual artefact). Finally, for some of the selected students, no upload could be identified at levels 2 and 3. A further challenge was inconsistency of the medium in which the work was presented, this was adjusted for in the choice of the rated criteria. All of these factors will have introduced some initial selection bias but it was agreed to be appropriate as a *known* bias, compared to the unknown biases that would have emerged without initial selection (e.g. such as how raters would treat divergent output types).

Creativity was the prime category to be assessed, but to aid understanding of the relationship between the quality of work and the interaction around it, other qualities like representation or liking were taken into account. The final selection of qualities to be rated also needed to conform with established standards of CAT. It is advised in this methodology, to keep all main dimensions separate to reach an independence of the judged criteria. This was addressed by introducing related categories to each dimension, i.e. in this case, novelty and originality as subcategories to creativity. However, this increased the number of judgements to be made. Rater fatigue was then a concern. We limited the rating to 20 individual pieces of work. This meant that judges considered work from all 3 levels of study of four students, work from 2 levels (levels 1 and 2) for three students, and work from level 1 only was rated for 2 students.

The final assessment matrix assessed 4 main dimensions: creativity, strength of concept, communication and liking, with 2 subcategories in each dimensions (Figure 3). Assessment was made on 6-point scale ranging from extremely strong to extremely weak.



Q6. Rate TMA03 - My Game Proposal on the following dimensions, using your own, subjective definition of each dimension.



My game is based on the working day in a library. Librarians have a number of challenges to complete before the end of the working day! The winner is the player with the most completed rota card.

	Extremely strong	Moderately strong	Slightly strong	Slightly weak	Moderately weak	Extremely weak
<b>Creativity</b>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Novelty	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Originality	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Strength of concept</b>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feasibility	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Usability	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Communication</b>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Representation	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Description	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Liking</b>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Aesthetic appeal	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Shining example?	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Figure 3 Qualtrics survey example of one rater for one work (showing the dimensions and scale for rating)

Assessors of students' work were six lecturers who teach on one or more modules in the Design and Innovation Qualification. As the judges were remotely located, the rating was made in electronic format using the online survey service 'Qualtrics' (<https://www.qualtrics.com>).

### Data on learner interaction on ODS

Quantitative and qualitative data on learners' interaction with the rated work was also collected. This included the number of views of an upload (only available in level 3 in this sample, because this measure was not collected in earlier version of ODS), the number of comments made on an upload, and the number of feedback requests. These are flags for students to request help from others.

### Data analysis

Descriptive statistics were used to analyse the quantitative data gained from the CAT ratings and measures of views, comments and feedback requests on the rated work. Linear and Rank Correlations were obtained from iNZight, an R-based Data analysis and visualisation tool. The comments and conversations on the rated work were analysed qualitatively to inform the quantitative findings and correctly interpret these in context.

## Findings

### Inter-rater agreement of the rated qualities



Cronbach's Alpha for each rated category was calculated using Wessa.net interrater agreement online calculator (Table 1). The combined interrater agreement for all items (Combined) of 0.68 was satisfactory, just slightly below the threshold of 0.7 for acceptable interrater agreement in design (Karl K. Jeffries, 2017). This internal consistency was interpreted to demonstrate that there was a sufficient consensus around overall quality, and good consistency in some qualities, to warrant further qualitative investigation.

*Table 1 Inter-rater agreement Cronbach Alpha*

Qualities	Cronbach Alpha
Combined	0.6803
Creativity	0.634
Novelty	0.5137
Originality	0.603
Strength of concept	0.4842
Feasibility	0.7168
Usability	0.755
Communication	0.6687
Representation	0.7056
Description	0.7663
Liking	0.5737
Aesthetic appeal	0.6828
Shining example?	0.7073

### ***Average expert's ratings of qualities***

Table 2 and Figure 4 show the ratings of the quality of students' work that ranged from a mean of 1.17, being the lowest to a mean of 5.67 being the highest rating, to a maximum of 6. Calculating the sum of all ratings for each work, out of a maximum of 72, 32.16 was the lowest and 59.99 the highest rated upload. Figure 4, shows the summative rating for each upload graphically. The average rating of all uploads was 46. This indicates that the students' work on ODS is rated better than average.

*Table 2 Ratings for each quality per student and level*

Student/Level	Creativity	Novelty	Originality	Strength of concept	Feasibility	Usability	Communication	Representation	Description	Liking	Aesthetic appeal	Shining example?	Rating sum
ABr L1	4.67	4.33	4.83	4.83	5.67	5.33	5.17	5.50	4.83	4.83	5.00	5.00	59.99
ABr L2	4.33	4.00	3.83	4.00	4.67	3.67	4.67	5.33	4.33	4.17	4.50	3.50	51.00
ABr L3	3.33	3.67	3.17	3.33	3.33	2.50	3.33	3.17	3.17	3.00	2.33	2.83	37.16
AC L1	4.67	4.67	3.83	4.83	5.00	5.17	5.00	4.33	4.83	4.00	3.67	3.50	53.50
AC L2	4.67	4.83	4.17	4.67	4.67	4.67	4.67	5.00	4.50	4.50	4.67	4.17	55.19
AC L3	2.67	3.00	2.50	3.50	3.67	3.67	3.83	3.33	3.83	3.17	2.33	2.50	38.00
PPS L1	4.00	3.50	3.83	3.50	3.33	2.50	2.67	3.50	2.33	3.67	4.17	3.00	40.00
PPS L2	3.17	3.00	2.83	3.17	2.83	1.83	2.67	3.00	2.00	2.83	2.33	2.50	32.16
PPS L3	4.50	4.50	4.50	3.83	3.50	3.17	5.17	4.83	4.83	4.17	4.33	4.17	51.50
SD L1	4.83	4.50	4.33	4.33	4.83	4.17	5.00	4.83	4.50	4.50	4.17	4.33	54.32

<b>DS L1</b>	3.50	3.50	3.17	3.50	3.83	3.50	4.00	3.50	3.83	3.00	2.33	2.83	40.49
<b>DS L2</b>	3.67	3.50	3.17	3.67	3.50	3.67	4.67	4.67	4.00	3.67	3.83	3.33	45.35
<b>SK L1</b>	3.50	4.00	3.67	3.67	3.67	3.17	3.33	3.67	2.83	3.33	3.17	2.33	40.34
<b>RW L1</b>	3.83	3.83	3.33	3.83	4.00	3.50	3.17	4.33	2.33	3.50	4.50	3.33	43.48
<b>RW L2</b>	4.17	4.33	3.67	3.50	3.00	3.00	4.50	5.33	2.83	3.50	3.33	3.17	44.33
<b>RW L3</b>	4.33	4.33	3.83	3.50	3.00	3.17	4.00	4.67	3.50	3.33	3.83	3.17	44.66
<b>ABu L1</b>	3.17	3.50	2.67	3.83	4.33	4.00	4.33	4.33	3.50	3.83	3.67	3.33	44.49
<b>ABu L2</b>	4.00	4.00	3.67	4.00	4.17	4.17	4.00	4.33	3.17	4.50	5.00	3.33	48.34
<b>FS L1</b>	5.17	5.00	5.00	5.17	5.17	5.17	4.50	5.00	4.33	4.67	4.67	4.33	58.18
<b>FS L2</b>	3.83	3.83	3.67	3.17	2.5	2.67	3.17	4.83	1.17	2.50	3.33	2.33	37.00

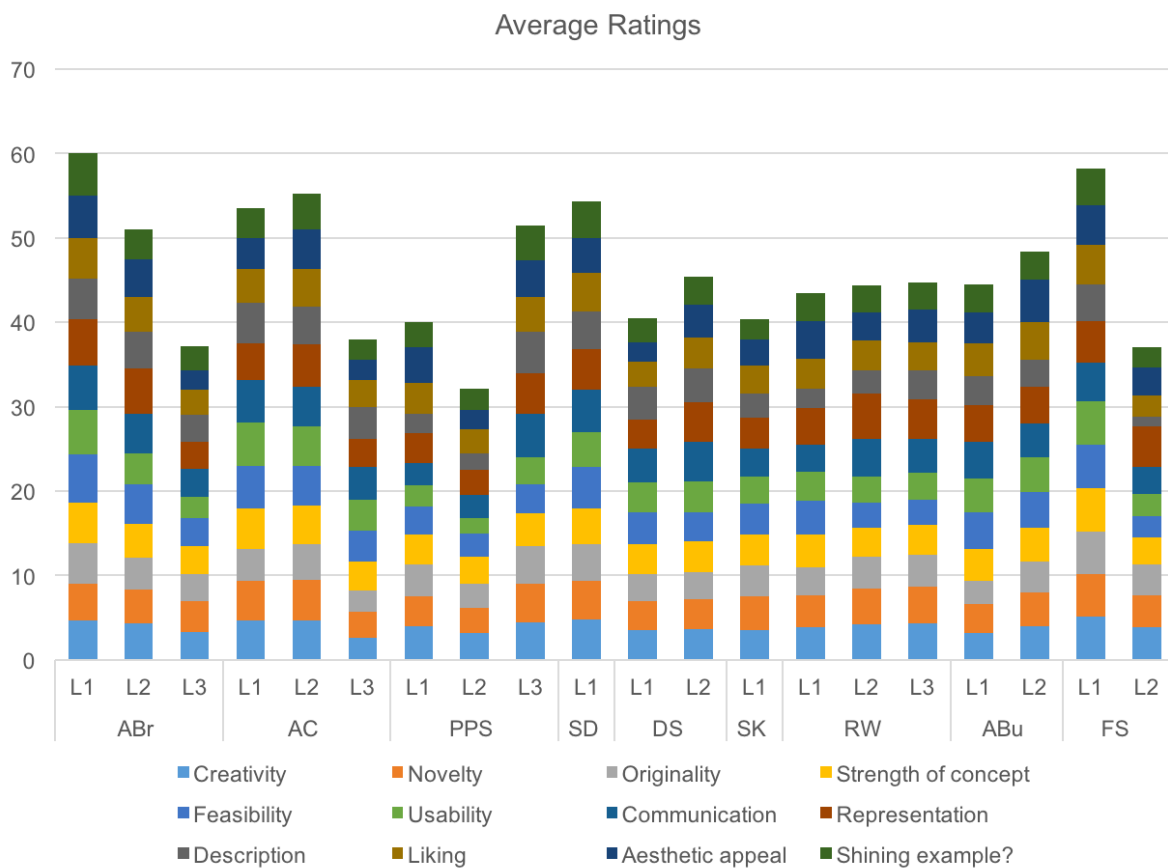


Figure 4 Combined rating of qualities by student (Acronym given) at each level

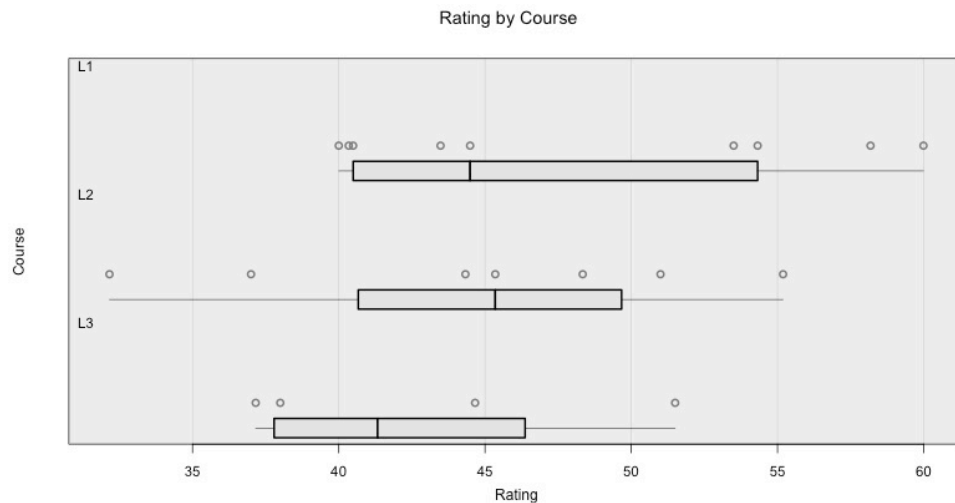


Figure 5 Combined rating of qualities across levels

Figure 5 shows a very light general downwards trend of assessment with increasing levels of study. The median in level 2 is even slightly higher than level 1 (45 in L2 compared to 44 in L1). Comparing the Mean produces clearer results, with 48 at level 1, 45 at level 2 and 43 at level 3. Level 3 produces the lowest overall quality scores.

### ***Relation of quality of work and comments on work***

There were between 0 and 10 comments on the rated work with an average of 2.4 comments (SD = 2.4) per piece of work. All rated work, except two, had at least one comment (Table 3).

Table 3 Sum of rating and engagement per student and level

	Rating sum	Views	Comments own	Comments other	Comments sum	Feedback request
ABr L1	59.99	na	1	5	6	1
ABr L2	51.00	na	0	0	0	0
ABr L3	37.16	6	0	1	1	0
AC L1	53.50	na	0	1	1	0
AC L2	55.19	na	0	1	1	0
AC L3	38.00	14	0	1	1	0
PPS L1	40.00	na	1	2	3	0
PPS L2	32.16	na	1	2	3	0
PPS L3	51.50	7	0	1	1	0
SD L1	54.32	na	1	4	5	0
DS L1	40.49	na	0	1	1	0
DS L2	45.35	na	2	2	4	0
SK L1	40.34	na	0	0	0	0
RW L1	43.48	na	5	5	10	0
RW L2	44.33	na	1	1	2	1
RW L3	44.66	20	0	2	2	0
ABu L1	44.49	na	0	1	1	0
ABu L2	48.34	na	0	2	2	0
FS L1	58.18	na	1	2	3	0
FS L2	37.00	na	0	1	1	0
	45.97	11.75	0.65	1.75	2.4	0.1

Figure 6 shows the correlation of the quality of rated work and comments on that work. The correlation is weak and not significant for both the Pearson Product Moment ( $r = 0.18$ ,  $p < 0.64$ ) and the Spearman Rank Correlation ( $\rho=0.21$ ). Hence, there is little evidence to support a correlation between the sum of rated qualities and student interaction. A previous study using a larger data set, however, identified that overall statistical measures such as this rarely provide insights that are useful in relation to specific learning events or learners (Jones, Lotz & Holden, 2017). This suggests that some students may not be paying attention to those items that expert raters consider to be of high quality.

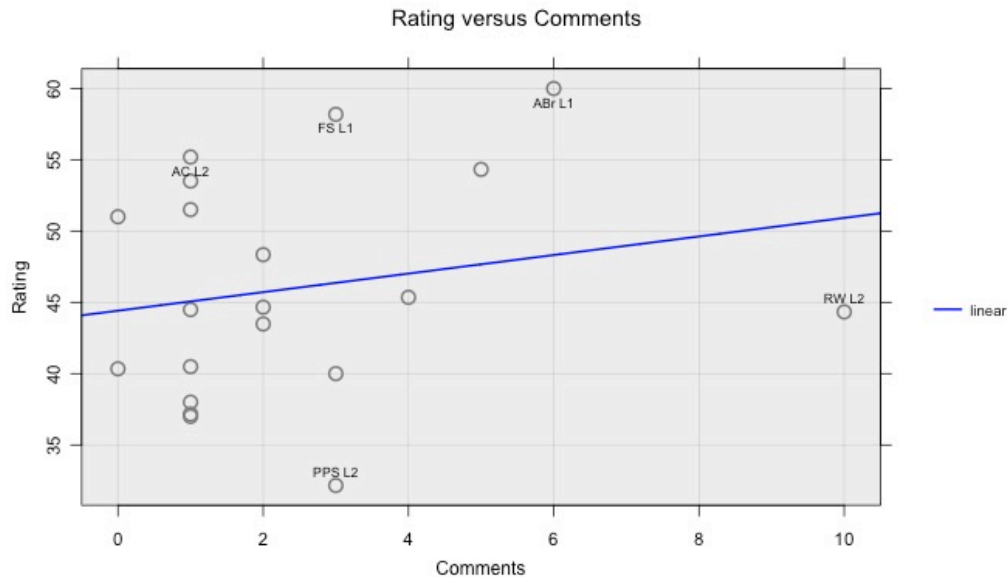


Figure 6 Correlation between the summative quality of students work and comments made on those uploads

If we distinguish between the levels of study, an interesting mix of correlations can be identified. While in level 1 and 3, we can observe some positive relations between summative quality and comments made on the students' work, level 2 has a negative relation. A caveat is the low sample size when the ratings are split across the levels, which renders the results neither significant nor robust.

### **Relation of Individual qualities' rating of work and comments**

In a next step the correlations for individual qualities were examined. At level 1, the moderate to strong positive and significant relation between Aesthetic Appeal and the number of comments sticks out (Table 4 Row 12). Likewise, at level 2, the one moderate to strong negative and significant relations can be found between Originality and comments made. The sample size at level 3 was too low to produce any significant and robust correlations.

Table 4 Spearman Rank Correlation and Pearson Product Moment for individual qualities at level 1-3

Quality	Level 1 (n=9)			Level 2 (n=7)			Level 3 (n=4)		
	SRC	PPM	p	SRC	PPM	p	Rank	Linear	p
<b>Creativity</b>	0.49	0.27	0.48	-0.75	-0.68	0.09	0.26	0.48	0.52
<b>Novelty</b>	0.16	0.08	0.83	-0.56	-0.58	0.17	0.26	0.44	0.56
<b>Originality</b>	0.41	0.23	0.55	-0.85	-0.78	0.03	0.26	0.26	0.74
<b>Strength of concept</b>	0.32	0.13	0.73	-0.37	-0.37	0.41	0.0	-0.13	0.84
<b>Feasibility</b>	0.37	0.20	0.60	-0.39	-0.42	0.34	-0.77	-0.87	0.13
<b>Usability</b>	0.30	0.07	0.85	-0.26	-0.28	0.54	0.0	0.06	0.94
<b>Communication</b>	0.15	-0.06	0.87	-0.25	-0.17	0.71	0.26	-0.07	0.93
<b>Representation</b>	0.53	0.46	0.21	-0.65	-0.54	0.21	0.32	0.51	0.49
<b>Description</b>	0.04	-0.16	0.68	-0.27	-0.12	0.79	-0.26	-0.31	0.69

Liking	0.46	0.28	0.46	-0.20	-0.24	0.60	0.26	-0.11	0.89
Aesthetic appeal	0.84	0.67	0.05	-0.33	-0.42	0.34	0.27	0.40	0.60
Shining example?	0.62	0.46	0.21	-0.32	-0.23	0.61	0.26	0.0	1

With this being an explorative, small scale study, it is of course difficult to pick out individual qualities in this way. However, the results provide some interesting patterns worth following up on. Using CAT and engagement measures, this work is easily replicable on a larger scale. Overall, however, it is not possible to rule out that there may be no strong link between what students pay attention to and what experts consider to be high quality work. To understand why this might be, a deeper understanding of the student comments on user-generated and expert rated work is needed.

### ***Students comments on qualities***

In level 1, the work by Abr (shown in Figure 3) that reached the highest rating of quality overall had made a feedback request (Table 2). The learner had asked for help on the visual impact of their work, which frames the goal of this conversation as appraisal. The student adds the description: *“My game is based on the working day in a library. Librarians have a number of challenges to complete before the end of the working day! The winner is the player with the most completed rota card.”* Four comments by other learners were received the same day.

*C1 “I like this a lot. Looks really well structured and I like the rota cards too. Very well thought out.”*

*C2 “It has great impact. You can see immediately what the game is about but it's also intriguing. You've presented your idea to a high standard but I have to say I love the Jelly Babies most of all :) Does the winner get a treat? Well done.”*

*C3 “Wow, the development from your prototype is superb!”*

*C4 “fantastic concept and game development well done id play it”*

The learner replied to these comments in one answer, making a playful reply on the topics of process of designing and the use of candies as play figures in the game. *“Many thanks for your positive comments. I've had a lot of fun with the whole family getting involved. The Jelly Baby Librarians kept disappearing but we had a bowl full of reinforcements!”*

The work by RW with most comments attached (10) at level 1 was average in the overall rating of quality (Table 2). The learner received 5 comments and thanked the commenter for the comment almost immediately, but without engaging in a more detailed discussion about the specific comment made. Comments were mainly around the professional looking representation of the work. And in fact the qualities Representation followed by Aesthetic Appeal had the highest ratings compared to all other ratings for this work.

*C1: Looks good [Student Name], did it play well?*

*C2: looks great, love the box!*

*S: thank you i spent ages making the box lol*

*C3: Wow, This is the complete package.*

*S: thank you very much! :D*

*S: yep it does play well thanks, I am really pleased with it! :D*

*C4: Your presentation is super! This really stands out and cries out for attention - jolly well done!*

*S: thank you!*

*C5: Well done, very professional looking.*

S: thank you :)

Another student's work with five comments (SD) was highly related in terms of Creativity, Feasibility and Representation (Table 2). The student replied on the next day to one comment made, while another student had already joined the discussion. The content creator successfully clarified the question about the layout of the board game, which was acknowledged by the commenter.

Other uploads with two comments had also replies from the creator of the content. The one work at level 1 that had no comments attached received one of the lowest ratings for overall quality. It should also be noted that the student has made no further uploads to ODS in levels 2 and 3.

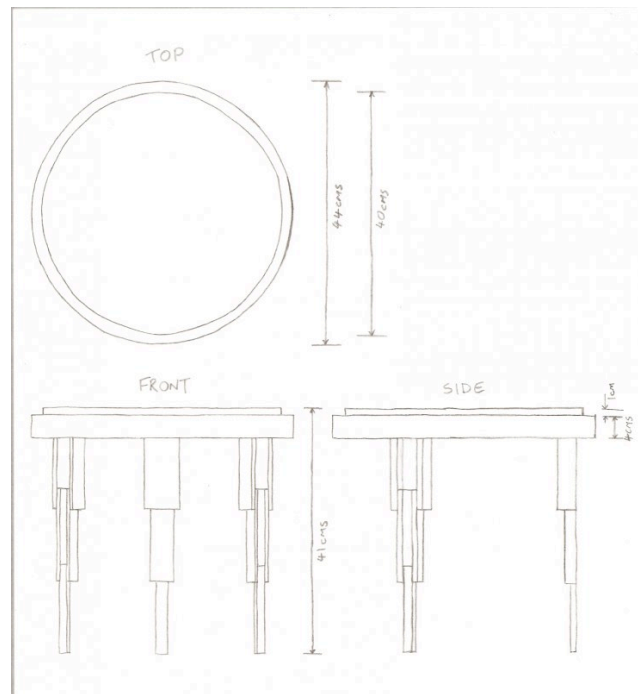


Figure 7 Example of students work uploaded to ODS at level 2

At level 2, the work with the overall highest quality rating (AC) only received one comment. The idea was around a navigation system for children for a nature trail. *"I like your idea of having different cube heights for different age levels. I also like the clarity of your final design, it is all very good. Nice one [student name]"*. Although the comment was made short after the work was posted, the content creator did not reply.

Figure 8 shows the student's work (DS) with the most comments (4) at level 2. This work was of average rating overall but received higher quality ratings for Communication, Representation and Description of their work. The comments complemented the creator on the representation of their idea, and critically evaluated points about usability and feasibility, which were lower rated qualities for this work, in fact. The lowest rating for this work was Originality.

*C1: Lovely clear drawings. I wonder if mud might be an issue when collapsing the legs? I know that sides of football pitches etc can often be pretty muddy and it may clog up the sliding mechanism - could a possible solution be to concertina the legs the other way round, i.e. the widest/outer part at the bottom? Your design certainly looks very compact and portable.*

*C2: I also like the drawings but think it could be a bit higher so that your legs would be a bit straighter.*

Delete

*S: Thanks for the feedback. Height has been a real issue as the seat is suitable for children and adults. I ended up taking measurements of a few seats around the home and concluded to the height I have presented. It was also necessary to make it this height in order to fold the legs into the base. If the legs were taller the base would need to be bigger and thus the seat would become less portable.*

*S: Hi C1 [Student name] Thanks for the feedback. I will certainly consider your advice as mud has been something that has been praying on my mind a bit.*

At level 2, the work with the lowest overall rating (PPS) was down-rated by its very low scores for Description, Aesthetic Appeal, Usability and Feasibility, while the comments focused much more on the sustainability aspect of this work, which was not a quality measure in the consensual assessment.

*C1: I like the upcycling concept behind this chair*

*C2: Using paper is a very clever idea. Cheap and environmentally friendly, adjustable to different needs and sizes. Ticks many boxes.*

*S: Cheers C1 [Student name], its just being a little bit of a challenge to make sure it is strong enough. I have been collecting newspapers for weeks in order to have enough to be able to make it!*

At level 3, three uploads received one comment each, and one upload received two comments. The work with 2 comments was of average rating. None of the students replied to the comments that were left on their work. The numbers at this study level are too low to meaningfully draw any conclusions or even comparisons with other study levels.

## Discussion

To answer the question: “How does the quality of learner-generated online content relate to learners’ comments and conversations around this content?”, the findings are discussed in the context of an emergent community of inquiry of design distance learners.

At level 1 there is some indication that initial incentive to comment on an upload is related to some of the expert rated qualities of the work, possibly the particular quality of Aesthetic Appeal. The interactions’ emphasis on aesthetics are mirrored in other studies on image-based OSNs (Zhu & Chen, 2015). This is further supported by design students’ comments, which often focus on the quality of Aesthetic appeal and also Representation of idea.

The comments and discussions at level 1 are relatively short and uncritical but have a vital social learning role, as noted in previous results (Lotz, Jones, & Holden, 2015; Jones, Lotz & Holden, 2017). The affective nature of the comments and discussions points to a social presence being established (Akyol, Garrison, & Ozden, 2009). Other scholars have found that peer feedback to design learners’ in commercial OSNs environments does not foster constructive learning conversations (Fleischmann, 2014), but (Lu & Churchill, 2014) suggest that the function of such conversations is to build a sense of community and social presence, which has been found to be essential to retain online learners (Garrison, Anderson, & Archer, 2010). Underlying this may be simple social mechanisms such as students constructing an identity with the contents they create and share, aiming for the highest quality they can achieve to put themselves into a favourable light (You, Bhatiab, & Luna, 2016).

At level 2, different observations can be made. A negative correlation is seen between the quality of work uploaded to ODS and the comments on that work, and in particular a significant negative relation of Originality to comments made. The least original work seems to receive most attention. At the same time, comments become more critical. It could seem as if commenters are attracted to ‘lower’ or medium quality uploads, to enable them to comment whilst making use of the new knowledge they have gained studying the module materials, for example sustainability issues in



design. The purpose of interaction with learner-generated contents in ODS seems to shift from interacting with the content with the highest Aesthetic Appeal at level 1 to engaging with content that gives scope to comment more critically. Again, this may be explained through social learning mechanisms such as how students compare themselves to those that are similar or slightly above / below them (Dunning, 2006; Festinger, 1954). If this is the case then it has important implications for social learning design in online studios in terms of how networks of students are supported and, more importantly, disrupted to provide the greatest opportunities for learning. It may also slightly contradict the typical finding in a proximate social setting, if students can be shown to be so consciously selective.

Students at level 2 seem to use the learners' names in their comments more, which indicates a level of familiarity. We don't know whether this familiarity is related to the fact that they actually know this person or whether they are just more familiar with the learning community and approach as such. Research suggests that affective expressions and social presence are indicators of a community of inquiry (Boston et al., 2010), which we might see evolving from level 1 to level 2 in the Design and Innovation Degree. A further explanation for this inversed relation of quality of work and comments on this work in ODS might be related to the Learning Design of the modules at the different levels (Garrison & Cleveland-Innes, 2005), who argue that social presence is not enough to feed an emergent community of inquiry, in particular the learners' cognitive presence needs to be developed to establish a deep and meaningful approach to learning and retain them. Such a procedural view of developing a community of inquiry online starting by developing a shared community identity before engaging in the development of critical facility is shared by Garrison et al (2010). This might also offer some explanation of the differences that are observed in proximate and online design studios. Joel (2007) found that in proximate design studios, students were happy to socialise but not to review the work of their peers, whilst studies in OSN's found that learners are much more task-oriented in their conversations around learner-generated contents (Lu & Churchill, 2014). It might be that these divergent results are due to the specific course learning design and stage of progression through a design qualification and not because one is a proximate and the other in an online design studio.

Finally, student motivation, personality type, learning style and socio-cultural background also play important roles in the creation of, and interaction with, learner-generated content (Murray et al., 2017), which was beyond the scope of this study, but requires further study. What this study does show is that the psycho-social aspects of student activity, behaviours and drivers in an online design studio are more significant than has perhaps been realised. That students are not behaving in the perfectly predictable way we had assumed should be no surprise to anyone with experience of any kind of education. But this still leaves the task of understanding what the actual behaviours are and whether they are positive within the learning context for students. For example, in parallel work for this project, so called 'passive' engagement and its relation to the assessed quality of its work uploaded was shown to be one of the most significant correlates to student success (Jones, Lotz & Holden, 2017).

In this study, and with a small-scale sample, the study is more explorative in nature, intended to investigate possible explanations of this type of behaviour. It needs to be repeated with larger sample sizes and distributions to validate the findings. Social network analysis should be integrated in a follow-on study to investigate the impact of existing or emergent social relations of learners at each level and across a qualification and investigate the relationships of networks to engagement with the uploads.

## Conclusions

What this study discovered was that design students might not pay attention to the things experts would consider to be of high quality. More importantly, what qualities students do attend to changes with increasing levels of study.

If educators want to encourage critical and constructive peer conversations to support online design learning, then a much deeper understanding of the engagement patterns and commenting behaviour over time needs to be gained. This study has shed light on the changing relationship between the quality of learner-generated content that is uploaded to an online design studio and the comments and discussions around this content. While commenting behaviour for students on an entry level course may be positively related to the quality of Aesthetic Appeal of that content, for more experienced students the behaviour seems to be the opposite. Here they comment on content that is not of the highest quality as assessed by experts, but their comments are more critical and draw on learning and content for the course. What is common to all study levels, however, is that the social learning taking place is an important motivation for engagement and interaction. Precisely what individual students take from this engagement is not simple or deterministic, but it is clearly of value to them as learners.

The implications of these findings are that design researchers and educators need to pay more attention to the changing dynamics of social behaviour in OSNs to effectively support online design learning. We also need to be aware that existing and popular OSNs like Facebook change. A recent study on the changes in patterns of interactions with Facebook from 2009 to 2014 (Paul et al., 2015) detected a maturation of the network, while the number of comments decreased there was an increasing number of likes or shares. These changing OSN mechanisms now seem to be very relevant and important at higher levels of study as we become aware of the importance of socially driven learning and design behaviours. Design scholars and educators need to be aware of these mechanisms when designing or considering OSNs and should challenge and be critical of their use pedagogically.

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